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Extraarticular resection of the knee for distal femur bone sarcomas: A retrospective review of 30 cases

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Background:

Limb salvage surgery of distal femur bone sarcomas requiring extraarticular knee resection remains a complex and challenging problem. Although historically tumor excision was accomplished by en-bloc resection of the entire knee and extensor mechanism, technical variants have been more recently described with the purpose of retaining at least part of the extensor mechanism and improve function. More extensive dissection and muscle sacrifice may result in less favorable outcome than the more commonly performed intra-articular resection.

Purposes:

Purpose of this study was to assess the following:

- Efficacy of tumor control;
- Early and long-term complications, with particular reference to revision surgery, implant failure and functional outcome;
- Correlation between outcome and different surgical techniques.

Patients and Methods:

Thirty patients that underwent extraarticular resection for bone sarcomas (1991-2013) were retrospectively reviewed; there were 27 high and 3 low-grade lesions. Median age was 27 years (range 11–66). Three different surgical techniques were compared: Classic (en-bloc resection of the extensor mechanism), Modified (continuity of the extensor mechanism retained by coronal osteotomy of the patella), and Patellar Enucleation (circumferential arthrotomy of the patella and primary closure of the joint). Three different implants were used: Guepar (Wright Medical, Arlington, TN), Lane-Burstein (Biomet, Warsaw, IN) and Finn (Biomet, Warsaw, IN) prosthesis. Minimum follow-up was 2 years (average 7.5 years; median 4,5; range 2-18 years). Functional outcome was evaluated by MSTS score and range of motion, with emphasis on extension lag. Regression analysis, assessed by using Kruskal-Wallis H test, a rank-based, non-parametric test, was based on significant P-value ≤ 0.05 . Implant survival and overall survival were assessed by Kaplan-Meier method.

Results:

- There was one local recurrence (3%); overall survival was 63% for high grade and 100% for low-grade tumors.
- Prosthetic survival was 80, 58, and 12 per cent at three, five, and ten years. Surgical complications rate was 60%; Infection was the most frequent cause of revision (36,8%), followed by aseptic loosening (27,7%), wear of prosthesis component (27,7%) and periprosthetic fracture (4,6%). Dislocation (3,2%) occurred in one patient treated with rotating-hinge prosthesis and Classic surgical technique. There was also one secondary amputation (3,2%).

- Average MSTS result was 25 (Classic 22, Modified 25, Patellar Enucleation 27 – p=0,33). Extension lag varied considerably in the 3 groups (Classic 68°, Modified 25°, Patellar Enucleation 3° – p=0,02)

Conclusions:

Studies published to date on extra-articular resection of the knee joint have reported local recurrence rate between 0 and 21%. In this series, extra-articular resection of the knee proved to be a safe procedure, with low risk of local relapse. However, it was associated with increased complication rate, inferior implant survival and function when compared to intra-articular resection. In particular, total or subtotal resection of the quadriceps was associated with poor prosthetic survival, as previously reported in the Literature. Patellar Enucleation demonstrated equally effective tumor control but less complications and significantly superior functional outcome compared to Classic and Modified technique.